IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:	Michael B. Ronci
Serial No.:	09/768,560
Filed:	January 25, 2001
For:	Temperature Indicating Beverage Cup
Group Art Unit:	2859
Examiner:	Verbitsky, G.

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ARGUMENTS IN RESPONSE TO OFFICE ACTION

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Honorable Sir:

In response to the Office Action dated 04/19, 2005, please accept the following amendment and arguments in support of the application.

REMARKS

The last Office Action dated April 19, 2005 has been carefully considered. It is noted that Claims 2-8 were rejected under 35 U.S.C. &103(a) as being unpatentable over Kilma, Jr. (U.S. 5997964) in view of Cranford (U.S. 6281165) and Weiss et al. (U.S. 5830596). Applicant respectfully seeks to traverse the rejection in that the Examiner has not established a prima facie case of obviousness with respect to claims 2-8.

The claimed invention is directed to a thermochromic display fixedly printed on the outside wall of a ceramic cup and claims features neither disclosed nor suggested by the references cited by the Examiner.

The disclosed invention specifically refers to a thermochromic display fixedly attached to a ceramic cup consisting of multiple indicators of different thermal properties that utilize hidden messages and which utilize thermochromic ink as opposed to liquid crystals. At the time the applicant conceived of this idea, there was no prior art consisting of all these features. As the applicant noted when he first disclosed the invention by filing a description of said invention with the Disclosure Document program, the idea of constructing multiple hidden message temperature indicator displays using liquid crystals had been known for some time as had the idea of using single hidden message indicators using thermochromic ink. The fact that both ideas had been known for some time without anyone arriving at the specific claims made by the applicant gives some credence to the idea that combining the two to arrive at his invention was not obvious. Furthermore, the applicant wishes to make the point that the advantages and disadvantages of the two materials – liquid crystals and thermochromic ink – tended to support the conventional wisdom of those in the industry, which was essentially that while thermochromic ink provided greater visability, its accuracy was not sufficient to be used in applications using more than one indicator. For applications that required anything more than a general indication that something was hot or not, multiple indicator liquid crystal displays or some other means, such as electronic temperature sensing or the utilization of a standard mercury thermometer were the methods of choice.

The following comparison between liquid crystals and thermochromic ink is useful in understanding why certain applications that work well with one material may not work as well or at all using the other material.

LIQUID CRYSTALS

Liquid crystals possess two temperatures – a lower temperature which I will call the bottom temperature, and a higher temperature which I will call the top temperature. When the temperature of a liquid crystal is below the the bottom temperature or above

the top temperature, it has a dark opaque color. When its temperature falls between these two, it takes on various lighter colors such as green and red. These lighter colors possess a translucence which allow hidden markings or messages printed beneath the liquid crystal to become partially visible. As a result, when the liquid crystal's temperature falls between the top and bottom temperatures, it has a built in way of revealing this visually. Liquid crystals can be manufactured so that this temperature range is as small as 1 degree Celsius thereby allowing them to specify a temperature with a fairly high amount of accuracy. This makes them ideally suited for use in multiple indicator temperature displays so that the temperature can be displayed with a high degree of accuracy over a large range of temperatures. In addition, liquid crystals possess a negligible degree of hysteresis, an attribute which I will discuss in more detail shortly. On the negative side, liquid crystals can not be applied directly to surfaces such as ceramic mugs. In addition the ability to distinguish between a liquid crystals' opaque state and its translucent state is impaired if they are viewed from an angle as opposed to head on.

THERMOCHROMIC INK

Thermochromic inks can also be said to possess two critical temperatures- a bottom and a top temperature. At temperatures lower than the bottom temperature, thermochromic inks have an opaque appearance. At temperatures above the top temperature, they are transparent, allowing hidden messages or images to be seen. When the temperature falls between these two, thermochromic inks have a partially transparent appearance, with the degree of transparency dependent on how close the temperature is to the bottom or top temperatures. Unlike liquid crystals, this in between temperature range can not be controlled during manufacture. The difference between the top and bottom temperatures is about 5 degrees Celsius. As a result, the accuracy of thermochromic ink is much less than liquid crystals. In addition, unlike liquid crystals, thermochromic inks possess a significant hysteresis – approximately 5 degrees Celcius. This means that the temperature range of a thermochromic ink, as defined by its top temperature and bottom temperature is about 5 degrees C higher when it is heated than when it is cooled. As a result, when a thermochromic ink is partially transparent it is necessary to know whether it has cooled down to that state or warmed up to it, in order to determine which 5 degree C temperature range the ink is indicating.

Thermochromic inks do however possess a few advantages over liquid crystals. For one, at temperatures above the top temperature, thermochromic ink is completely transparent, allowing any hidden messages to be clearly revealed. In contrast, liquid crystals become translucent, allowing hidden messages to be revealed, but not nearly with as much clarity. In addition, when transparent, any hidden messages lying beneath thermochromic ink can be clearly seen whether viewed from a side angle or head on. This is in contrast to liquid crystals. Additionally, thermochromic ink can be directly printed onto a ceramic surface such as a coffee mug, where liquid crystals can't.

It was the applicants innovation to recognize that for certain applications, a display using multiple thermochromic ink indicators could be used to provide a temperature display that, while not as accurate as a liquid crystal display, would be accurate enough for the particular application. A feature vital for giving greater accuracy to such a display, is the use of hidden messages which, by providing a visual reference point, allow the user to discern smaller more subtle temperature differences than would be discernable otherwise

Therefore, the following three features of the invention : the use of thermochromic ink, the use of multiple thermochromic ink indicators having different and complimentary thermal properties, and the use of hidden messages are all germane to the idea of providing an affixed temperature indicator for a coffee mug that provides both good visibility, and sufficient accuracy to be useful to someone trying to determine the temperature of his coffee.

Addressing the specific references cited by the examiner to support her argument of obviousness, the applicant wishes to begin by pointing out that while Kilma refers to a heat-sensitive thermochromic device, he does not refer to a display using thermochromic ink, but rather to one utilizing liquid crystals. The applicant asserts that by way of his previous argument above which considered the substantial differences between the two materials, it is in no way obvious that an invention utilizing a multiple indicator liquid crystal temperature display would work in the same way described by substituting the liquid crystal display with a display using thermochromic ink. Further, it should be noted that the display referred to by Kilma is not fixedly attached to the device whose temperature is being measured but is instead, an attachable device.

The applicant also respectfully disagrees with the examiners citing of Weiss as grounds for rejection due to obviousness. While Weiss does disclose a device utilizing thermochromic ink to indicate the charge of a battery, there are significant differences between the Weiss invention and the applicants. One difference between Weiss's device and the applicants is that Weiss ultimately seeks to measure charge, not temperature. In order to measure the charge of a battery, Weiss discloses a device that can be attached to a battery to conduct current and assess its strength by measuring the temperature change caused by the current. Being that neither Kilma nor Weiss disclose a temperature indicator that is fixedly attached to the object of interest, they do not make the applicants invention, which is fixedly attached, obvious. Furthermore while, unlike Kilma, Weiss does disclose the use of thermochromic ink as one embodiment of his device he does not disclose a display using multiple indicators as disclosed by the applicant.

It is interesting to note that in one portion of the Weiss patent where he attempts to expand the use of thermochromic ink beyond its normal use as a binary indicator and attempts, as does the applicant in his patent, to increase the range of temperatures being measured beyond what is possible with the use of only a single thermochromic ink, Weiss fails to disclose the use of separate thermochromic ink indicators with different

thermal properties and instead arrives at a different solution, namely the application of thermochromic ink with different thermal properties on top of one another. It is the applicants opinion that the fact that Weiss attempts to address the same problem the applicant addresses in his patent, namely using thermochromic ink to indicate a wider temperature range than is allowable than is allowable with a single thermochromic ink, and in doing so overlooks the applicants solution while coming up with an alternative solution is grounds for arguing that the applicants patent is not obvious with reference to Weiss. A patent should be taken in its entirety, and those portions tending to argue away from the applicants invention should be considered.

Accordingly, as the Examiner has failed to meet the burden of establishing a prima facie case with the art cited, and such art is not sufficiently analogous to be cited in an obviousness rejection against the applicant, the rejection of Claims 2-8 should be considered improper. The Applicant hereby requests that the rejection be withdrawn and the application be allowed to pass to issue.

Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully asked that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. Alternatively should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, she is invited to telephone the undersigned.

Respectfully submitted:

By: Mike Ronci on 7/15/05

Michael B. Ronci
51 Pinehurst Circle
Ormond Beach, Florida 32174
386)677-4264